

## ABSTRACT

A defect free semipermeable composite membrane having excellent integrity and high water permeability is provided. Said composite membrane comprises an inside support layer to provide sufficient mechanical strength, an outside barrier layer to provide selective separation and a middle layer to provide both chemical and physical binding between the support and the barrier layers. Three different methods for making said defect free composite membrane are discovered. These methods have been successfully used to produce high quality coatings and defect free composite membranes, which are independent of chemical composition and physical structure of said support. In the present invention, the ultrasonic sonication is utilized to speed up the phase inversion process of a membrane casting solution, and to produce a composite membrane at a speed higher than that disclosed in the prior art. Said defect free composite membranes have broad applications, ranging from filtration of fruit juice, wine and milk to purification of drinking water, municipal and industrial wastewater.